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Autobiographical memory and well-being in aging: The central role of semantic self-images

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ABSTRACT

Higher levels of well-being are associated with longer life expectancies and better physical health. Previous studies suggest that processes involving the self and autobiographical memory are related to well-being, yet these relationships are poorly understood. The present study tested 32 older and 32 younger adults using scales measuring well-being and the affective valence of two types of autobiographical memory: episodic autobiographical memories and semantic self-images. Results showed that valence of semantic self-images, but not episodic autobiographical memories, was highly correlated with well-being, particularly in older adults. In contrast, well-being in older adults was unrelated to performance across a range of standardised memory tasks. These results highlight the role of semantic self-images in well-being, and have implications for the development of therapeutic interventions for well-being in aging.

1. Introduction

The way we remember our past is thought to influence both our sense of self and our general well-being. However, the mechanisms underpinning the links between memory, self and well-being are little understood. This study aimed to investigate the relationships between well-being and two types of autobiographical memory: semantic self-images (e.g., autobiographical knowledge about the self, comprising traits, family roles and group-membership) and episodic autobiographical memories (detailed memories of specific, personally-experienced events). Furthermore, in light of established age-related changes in memory function (e.g., Levine, Svoboda, Hay, & Winocur, 2002; Piolino, Desgranges, Benali, & Eustache, 2002), we tested younger and older adult groups in order to examine whether these relationships differ between age groups. A better understanding of the role that different types of memory play in well-being has important implications. People with higher levels of well-being benefit from more than simply positive mood and good social relationships (Diener, 2013), they also have increased life expectancies and better physical health (Diener & Chan, 2011; Kok et al., 2013). Crucially, this study took the novel approach of comparing the roles of semantic and episodic autobiographical memory, addressing the recent call for more detailed investigation of the function of semantic components of autobiographical memory (e.g., Haslam, Jetten, Haslam, Pugliese, & Tonks, 2011; Prebble, Addis, & Tippett, 2013; Thomsen, 2009).

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Traditionally, the main focus of autobiographical memory research has been on episodic, rather than semantic, memories (see Thomsen, 2009). Episodic autobiographical memories relate to a specific moment in time and typically include sensory-perceptual details (e.g., visual imagery and sensory information) and are characterised by a sense of 'mental time travel' (Tulving, 1983, 2002). In contrast, semantic autobiographical memories involve simply knowing about an event or fact, without a sense of mentally travelling back and re-living a specific event (Tulving, 1983, 2002). These semantic autobiographical memories include knowing the locations of countries visited on holiday and names of family members. They also include the sets of traits, roles and beliefs that form semantic self-images, such as knowing one is a retired accountant and a mother of two children. Semantic self-images are thus a particularly self-relevant subsection of semantic autobiographical memory. Research suggests that as we get older, sensory-specific episodic memories become less accessible, whilst semantic autobiographical memories are retained (e.g., Levine et al., 2002; Piolino et al., 2002).

Specific episodic autobiographical memories arguably play a range of important roles, including promoting social intimacy (Pillemer, 1998), acting as landmark events marking transitions in the life story (Shum, 1998; Thomsen, Pillemer, & Ivcevic, 2011), and engaging people with their long-term goals (Singer & Salovey, 1993). However, recent work (e.g., Haslam et al., 2011; Thomsen, 2009) has emphasised the important role of semantic autobiographical memory. Key to the present study, Piolino et al. (2006) proposed that the retention of semantic autobiographical memories may play a central role in enabling older adults to maintain a sense of diachronic unity. Haslam et al. (2011) suggest semantic self-knowledge is a bi-directional mediator between episodic autobiographical memory and identity. They proposed that episodic autobiographical memories provide the basis for semantic autobiographical memories, and it is these semantic "facts" that support the self.

Prebble et al. (2013) developed this idea further, proposing that semantic autobiographical memories may help form a scaffold for both episodic recollection and imagination of future events (e.g., Irish, Addis, Hodges, & Piguet, 2012). Prebble et al. suggest that self-continuity in older adults is maintained by semantic autobiographical memory. Semantic autobiographical memories may provide a more efficient means of promoting narrative continuity, possibly by virtue of the fact that they can be used to synthesise and organise large amounts of information into a coherent life story (Prebble et al., 2013). In support of this organisational account, Thomsen (2009; Thomsen et al., 2011) proposed that people use semanticised life story chapters (e.g., time at university X) to organise autobiographical retrieval and shape a narrative life story. Semantic facts structure the way we remember the past and also the way children imagine the future (Bohn & Berntsen, 2011). In short, a growing number of researchers have emphasised the role that semantic autobiographical memory plays in organising memory and promoting a coherent sense of self.

Semantic autobiographical memory is the most resilient form of autobiographical memory, preferentially preserved in healthy aging (Levine et al., 2002; Piolino et al., 2002) retrograde amnesia (Klein & Lax, 2010; Rathbone, Moulin, & Conway, 2009), depression (Dalgleish et al., 2007), autism (Crane & Goddard, 2008) and Alzhiemer's disease (Martinelli, Anssens, Sperduti, & Piolino, 2013). In addition to highlighting the dissociation between episodic and semantic memory, these studies also raise the possibility that semantic self-images might be a useful starting point for rehabilitation in a range of clinical groups. The present study was particularly focused on the emotional valence of semantic self-images and episodic autobiographical memories. This is because there are established age-related changes in the emotional ratings of autobiographical memory (e.g. the positivity effect; Kennedy, Mather, & Carstensen, 2004), but little is known about how these might relate to well-being.

Well-being can be conceptualised at both the eudaimonic and hedonic level. Eudaimonic well-being is associated with viewing one's life with meaning, purpose and a sense of growth (Bauer, McAdams, & Pals, 2008) and using and developing the best aspects of oneself (Huta & Ryan, 2010). Eudaimonic well-being is often conceptualised as "psychological well-being" (e.g. Ryff & Keyes, 1995), although other conceptualisations exist (for a review, see Huta, 2013). Hedonic well-being focuses on both the experience of pleasure and a more cognitive evaluation of life satisfaction (Diener, 2013). Recent empirical work suggests that hedonic and eudaimonic well-being may overlap, with greatest overall well-being perhaps stemming from the pursuit of both hedonic and eudaimonic aims (Huta & Ryan, 2010).

We suggest that semantic self-images play a crucial role in supporting the self. The present study aimed to explore the role of semantic self-images in well-being in aging, and centred on three main research questions, which will be explored in detail below: (1) How does the emotional valence of episodic autobiographical memories and semantic self-images differ between younger and older adults; (2) is well-being correlated more strongly with the valence of semantic self-images or episodic autobiographical memories and does this differ between younger and older adults; (3) in older adults, is the valence of semantic self-images more strongly correlated with well-being than objective measures of memory performance.

The first research question focused on the phenomenological ratings of episodic autobiographical memories and semantic self-images in the two age groups. Older adults tend to rate their episodic autobiographical memories more positively than younger adults (the "positivity effect"; Kennedy et al., 2004; Schlagman, Schulz, & Kvavilashvili, 2006; Schryer, Ross, St-Jaques, Levine, & Fernandes, 2012). Compared to younger adults, older adults tend to reappraise negative memories in a more positive light (Comblain, D'Argembeau, & Van der Linden, 2005) and report a larger proportion of positive than negative autobiographical memories (e.g., Mather & Carstensen, 2005). The first prediction, in line with the positivity effect (e.g., Kennedy et al., 2004), was that older adults would rate both their semantic self-images and episodic autobiographical memories more positively than younger adults.

The second research question centred on the relationships between well-being and the emotional valence of episodic autobiographical memories, and semantic self-images. In particular, it aimed to elucidate the role that semantic self-images play in well-being. Swann and Buhrmester (2012) suggest that stable self-representations are vital for social interactions, making goals, and enabling a sense of belonging. The present study sought to ascertain whether the valence of semantic

self-images was more closely related to well-being than the valence of episodic autobiographical memories. Well-being may be associated with the way that autobiographical memories are framed (Philippe, Koestner, Beaulieu-Pelletier, Lecours, & Lekes, 2012). For example the presence of 'growth' memories (e.g., goal-related memories that lead to a richer understanding of oneself and one's life) has been associated with increased ratings of well-being (Bauer et al., 2008; Bauer, McAdams, & Sakaeda, 2005; Philippe et al., 2012). Whilst there is a general consensus that judgements of mood and well-being are affected by the emotions associated with autobiographical memories (e.g., Hart, 2013), it is unclear which level of autobiographical memory (e.g., semantic or episodic) is involved. This question has particular relevance to aging, as research suggests that older adults may use semantic self-images to buffer against the negative effects of aging (Heidrich & Ryff, 1993). Older adults with negative self-perceptions of aging tend to show a decline in physical (Sargent-Cox, Anstey, & Luszcz, 2012) and psychological well-being (Mock & Eibach, 2011). Indeed, the self-system has been conceptualised as a "coping resource in the aging process" (Diehl, Hastings, & Stanton, 2001, p. 644). The present study thus sought to elucidate the relationship between the emotional valence of semantic self-images and well-being. Based on recent work suggesting that semantic autobiographical memories support identity and organise autobiographical retrieval (Prebble et al., 2013; Thomsen, 2009), the second prediction was that in both younger and older adults, the emotional valence of semantic self-images would correlate more closely with measures of well-being than the emotional valence of episodic autobiographical memories.

The third research question focused only on the older adult group. We aimed to establish whether memory performance on a range of standardised cognitive tasks was related to well-being. Previous work has suggested that cognitive decline in aging is associated with decreased well-being (Llewellyn, Lang, Langa, & Huppert, 2008; Wilson et al., 2013). However, well-being in older adults tends to be rated relatively highly, in spite of declines in physical and cognitive health (Scheibe & Carstensen, 2010). Research testing older adults with dementia indicated that identity (measured as strength of personal identity) mediated the effects of memory loss on well-being, suggesting that it is not memory loss per se that leads to lower well-being (Jetten, Haslam, Pugliese, Tonks, & Haslam, 2010). The design of the present study enabled a clear comparison between the roles of both episodic autobiographical memories and semantic self-images, and the role of standardised memory performance, in well-being. This question has implications for our aging population. In essence, do the changes in memory associated with aging necessarily relate to how positive people feel about themselves and their lives? It was predicted that well-being would correlate more closely with how positively participants viewed themselves (e.g. emotional valence of semantic self-images) than how well they performed in standardised memory tasks.

2. Method

2.1. Participants

Participants consisted of 32 younger adults (26 female; mean age = 20.25; SD = 2.99; range = 18–28) and 32 older adults (19 female; mean age = 70.22; SD = 3.02; range = 65–75,). The younger adults were psychology students at a UK university who received credits for participating. The older adults were recruited from a database of local adults interested in participating in research projects. All participants were community-dwelling and provided details of mental and physical health and any previous history of substance abuse. Five of the older and five younger adults reported a history of anxiety and/or depression. Cognitive function was measured using the Trail Making Tests A and B (completion time in seconds; Reitan, 1958), vocabulary sub-test of WAIS-R (Wechsler, 1981), and category (animal) and letter (F) fluency (Tombaugh, Kozak, & Rees, 1999). For details of participant characteristics see Table 1.[1] In line with previous research, compared to younger adults, the older adults performed better on the vocabulary task (Verhaeghen, 2003) but worse on the trail making tasks (Kennedy, 1981) and category fluency task (Tomer & Levin, 1993).

2.2. Materials and procedure

All participants completed the IAM task (Rathbone, Moulin, & Conway, 2008), three measures of cognitive function (described above), and five measures of well-being in one lab-based session that lasted between 1.5 and 2 hours. The older adult group also attended a second 1-hour session in which they completed an additional set of memory and cognitive function tests. This second session took place within two weeks of session 1.

2.2.1. IAM task

Participants generated up to 10 'I am' statements and then selected their two most important statements as cues for up to five episodic autobiographical memories per statement (generating up to 10 memories in total).[2] All episodic

[1] As several of the variables were not normally distributed (tested using Shapiro–Wilk, $p < .05$) the relevant data in Tables 1 and 2 were also analysed using Mann Whitney U tests. All patterns of results using non-parametric tests were identical to those using parametric tests. Correlational analyses presented in Tables 3 and 5 were also repeated for non-normally distributed variables using Spearman's Rho. The only two results to differ using non-parametric tests were as follows: (1) the correlation between episodic memory valence and PANAS positive scores in the younger adult group was non-significant using Spearman's Rho ($Rs(29) = .32$, $p = .080$), and (2) the correlation between older adults' AMI Semantic score and Psychological Well-being (PWB) became marginally significant using Spearman's Rho ($Rs(30) = .36$, $p = .041$).

[2] Additional memories were collected for use in a methodological short report, currently in preparation.

Table 1
Participant characteristic: years of education and scores on cognitive tests.

Measure	Younger group		Older group		*F*	*p*	Partial η^2
	M	*SD*	*M*	*SD*			
Years of education	14.69	1.51	14.25	3.62	0.40	.530	.01
Trail making A	25.56	6.13	37.97	20.37	10.88	.002	.15
Trail making B	57.88	18.80	88.74	44.99	12.77	.001	.17
Vocabulary	37.28	7.11	46.56	9.88	18.62	.000	.23
Letter fluency	15.56	5.83	16.44	5.05	0.41	.523	.01
Category fluency	24.19	5.25	20.50	5.22	7.95	.006	.11

Note. Details of measures used are provided in the Method section. Degrees of freedom for all ANOVAs were (1, 62) except for Trail making B which was (1, 61).

autobiographical memories were dated for age at event, and rated on an 11-point scale for vividness (0 = not at all vivid, 10 = very vivid), emotional valence (−5 = very negative, +5 = very positive), personal significance (0 = not at all personally significant, 10 = very personally significant), rehearsal (0 = never think about it, 10 = think about it all the time) and on a dichotomous scale for imagery perspective (observer or field). Memories were rated in two ways for episodic specificity. First, participants were provided with standardised Remember/Know/Guess instructions (Gardiner, 1988) and asked to rate whether each memory was something they remembered (R), knew (K) or guessed (G). All responses rated as R were probed for episodic details, and were rated as Justified Remember (JR) if such details were provided (following Piolino et al., 2003). Memories were also rated for specificity by the researcher using a 0 to 4 scale (Baddeley & Wilson, 1986), in which 4 = a specific event with details and situated in time and space, 3 = a specific event without any detail but situated in time and space, 2 = a repeated or extended event situated in time and space, 1 = a repeated or extended event not situated in time and space, and 0 = no memory given/only general information about the topic. All 'I am' statements (e.g. semantic self-images) were rated by the participant for emotional valence (−5 = very negative, +5 = very positive), age of identity formation, and importance (0 = not at all important, 10 = very important). Thus, the emotional valence scores for both semantic self-images and episodic autobiographical memories were based on comparable participant-reported rating scales.

2.2.2. Well-being scales

A range of scales were employed to assess eudaimonic, hedonic, and clinically-relevant measures of well-being. Eudaimonic well-being was measured using the 42-item Psychological Well-being Scale (PWB; Ryff & Keyes, 1995; total scale score). Hedonic well-being was measured with scales that tapped into emotional experience (e.g., The Positive and Negative Affect Schedule, PANAS trait version [participants rated to what extent they "generally feel this way...on average"] Watson, Clark, & Tellegen, 1988), evaluation of how positive or negative one's life has been (Satisfaction with Life Scale, SWLS; Diener, Emmons, Larsen, & Griffin, 1985), and optimism (Life Orientation Test-Revised Optimism Scale; LOT-R; Scheier, Carver, & Bridges, 1994). Finally, the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) provided a more clinically-relevant measure of well-being.

2.2.3. Additional measures for older adult group

The Autobiographical Memory Interview (AMI; Kopelman, Wilson, & Baddeley, 1989) assessed episodic and semantic autobiographical memory, the Rey-Osterrieth Complex Figure Test (Osterrieth, 1944; Rey, 1941) assessed visuospatial memory, the Logical Memory Test (LMT; subtest of Wechsler Memory Scale, Wechsler, 1997) assessed recall and recognition for narrative memory, the Graded Naming Test (GNT; McKenna & Warrington, 1983) measured semantic memory for object names, and the Everyday Memory Questionnaire (EMQ; Sunderland, Harris, & Gleave, 1984) was a self-report measure of participants' day-to-day memory problems. General cognitive function was assessed using the Montreal Cognitive Assessment (MOCA; Nasreddine et al., 2005).

2.2.4. Statistical procedures

Comparisons of episodic autobiographical memory and semantic self-image ratings between younger and older adults were based on ANOVAs with 'age group' as a between subjects factor. In order to examine the relationships between well-being scales, and episodic autobiographical memory and semantic self-images ratings within each age group, Pearson product-moment correlation coefficients were calculated.

3. Results

The first aim of this study was to examine whether the phenomenological ratings for semantic self-images and episodic autobiographical memories differed between younger and older adults. Mean ratings and ANOVA results for older and younger adults are shown in Table 2. For completeness, we also include comparison of well-being scores between groups.

Results suggest that age has no effect on the emotional valence, importance, or frequency of semantic self-images generated. In contrast, older adults' episodic autobiographical memories were significantly more positive, and rehearsed less frequently, than those of younger adults. As one would expect, older adults' episodic memories were dated at a higher mean age

Table 2
Mean semantic self-image, episodic autobiographical memory, and well-being scores in younger and older adults.

Measure	Younger group		Older group		*F*	*p*	Partial η^2
	M	*SD*	*M*	*SD*			
Self-images							
Valence	2.85	1.06	2.45	1.63	1.37	.247	.02
Importance	7.49	1.11	7.48	1.38	0.00	.986	.00
Frequency	9.84	0.63	9.72	1.11	0.31	.582	.01
Episodic memories							
Valence	1.10	1.38	1.99	1.54	5.90	.018	.09
Meaningfulness	5.71	1.57	6.12	1.99	0.85	.361	.01
Vividness	6.81	1.02	6.86	1.89	0.01	.911	.00
Rehearsal	3.70	1.20	2.64	1.42	10.35	.002	.14
Age at event	15.28	2.48	42.98	10.86	197.85	.000	.76
Proportion field	0.80	0.16	0.92	0.16	8.02	.006	.11
Proportion JR	0.85	0.19	0.82	0.19	0.39	.536	.01
Episodic specificity	3.73	0.36	3.51	0.46	4.52	.038	.07
Well-being scales							
PWB Scale	222.74	33.71	221.69	35.68	0.02	.904	.00
PANAS positive	36.16	7.29	35.17	6.38	0.32	.574	.01
PANAS negative	17.71	4.75	17.21	6.54	0.12	.730	.00
SWLS	23.91	5.79	23.97	7.80	0.00	.972	.00
LOT-R	15.41	3.83	16.25	4.20	0.71	.404	.01
HADS	11.23	5.79	9.41	4.68	1.89	.174	.03

Note. Age at event = participant's age at time of event; PWB = Psychological well-being; PANAS = Positive and Negative Affect Schedule; SWLS = Satisfaction with Life Scale; LOT-R = Life Orientation Test-Revised; HADS = Hospital Anxiety and Depression Scale (total score used). Degrees of freedom for all ANOVAs were (1, 62) except for PANAS Positive (1, 59), PANAS negative (1, 58), SWLS (1, 61) and HADS (1, 61).

at event, and were rated as containing less episodic detail than younger adults' memories. There was also an age effect for proportion of memories viewed from a field perspective; older adults were more likely to remember events from a field perspective than younger adults, but both age groups used a field perspective for the vast majority of their memories. There were no significant differences in well-being measures between age groups. To examine whether gender had any effects on these data, it was included as covariate in the ANOVAs shown in Table 2. Gender had no significant effects on any of the key variables in this study (well-being scales and valence of episodic autobiographical memories and semantic self-images).

The second aim was to explore the relationships between the emotional valence of semantic self-images and episodic autobiographical memories and participants' well-being scores. Semantic self-image valence scores were calculated using participants' mean emotional valence ratings for all self-images generated in the IAM Task. Episodic autobiographical memory valence scores were calculated using participants' mean emotional valence ratings for all episodic memories generated in the IAM Task. To better understand how these relationships might differ between age groups, correlational analyses were run within groups for younger and older adults (see Table 3).

Table 3
Correlations between valence of semantic self-images, episodic autobiographical memories and well-being measures in younger and older adults.

Measure	Memory valence	PWB Scale	PANAS positive	PANAS negative	SWLS	LOT-R	HADS
Younger group							
Self-image valence	.41*	.45**	.46**	−.02	.38*	.05	.05
Memory valence		.17	.36*	−.06	.19	.11	−.02
PWB Scale			.78***	−.48**	.78***	.68***	−.68***
PANAS positive				−.28	.69***	.51**	−.45*
PANAS negative					−.41*	−.41*	.58**
SWLS						.61***	−.46**
LOT-R							−.49**
Older group							
Self-image valence	.44*	.60***	.75***	−.65***	.49**	.51**	−.49**
Memory valence		.20	.23	−.04	.08	.25	−.03
PWB Scale			.72***	−.82***	.75***	.66***	−.74***
PANAS positive				−.66***	.60**	.56**	−.69***
PANAS negative					−.66***	−.61***	.71***
SWLS						.76***	−.80***
LOT-R							−.76***

* $p < .05$, two-tailed.
** $p < .01$, two-tailed.
*** $p < .001$, two-tailed.

As one would expect, both age groups showed multiple significant correlations between well-being measures, but of particular interest were the correlations between well-being and semantic self-image valence, as well as well-being and episodic autobiographical memory valence. All correlations were in the expected direction, with higher (i.e. more positive) emotional valence ratings for semantic self-images associated with increased well-being (e.g., higher scores on the PWB Scale, PANAS positive, SWLS, and LOT-R, and lower scores on the PANAS negative and HADS). There were no significant correlations between episodic autobiographical memory valence and well-being in the older adult group, whilst episodic autobiographical memory valence correlated with only the PANAS positive measure in the younger adult group. In contrast, the valence of younger adults' semantic self-images correlated with three well-being measures and in the older adult group significant correlations were shown between semantic self-image valence and all measures of well-being.

This critical finding suggests that, in both younger and older adults, semantic self-image valence is more closely correlated with well-being than episodic autobiographical memory valence. To examine this further, the correlation co-efficients in Table 3 were entered into Hotelling William method t tests. This tested whether there was a significant difference between the correlations for well-being and valence of episodic autobiographical memories compared to between well-being and valence of semantic self-images.

Results (shown in summary in Table 4) indicated that, within the older adult group, five out of the six measures of well-being were more significantly correlated with valence of semantic self-images than valence of episodic autobiographical memories. In contrast, within the younger adult group there were no significant differences between correlations for well-being and episodic autobiographical memory valence compared to semantic self-image valence.

The final aim was to examine whether increased well-being scores were associated with better cognitive performance in the older adult group. For this purpose, correlational analyses were run on scores obtained on a battery of cognitive tasks, including objective memory measures (e.g., AMI, LMT, GNT) and the subjective self-report EMQ, alongside well-being scores (see Table 5).

The EMQ was significantly negatively correlated with the PWB Scale and PANAS positive, and significantly positively correlated with the PANAS negative and HADS. High scores on the EMQ indicate self-reported experience of a high number of everyday memory problems, thus these correlations are in the expected direction. None of the objective measures of

Table 4
Hotelling William t-tests comparing correlation coefficients between valence of semantic self-images and episodic autobiographical memories with well-being in older and younger adults.

Well-being measure	Younger group Self-image valence compared to episodic memory valence	Older group Self-image valence compared to episodic memory valence
PWB Scale	1.56	2.52*
PANAS positive	0.55	3.84***
PANAS negative	−0.18	4.09***
SWLS	1.02	2.34*
LOT-R	−0.33	1.51
HADS	0.12	2.71*

Note. Table shows *t* statistic for the comparison of correlation coefficients in Table 3.
* $p < .05$, two-tailed.
*** $p < .001$, two-tailed.

Table 5
Correlations between well-being and objective memory performance in older adults.

Measure	LM DR	ROCF DR	GNT	MOCA	AMI Semantic	AMI Episodic	PWB Scale	PANAS positive	PANAS negative	SWLS	LOT-R	HADS
EMQ	−.05	−.04	−.18	−.29	−.14	−.15	−.46**	−.45*	.49**	−.18	−.21	.44*
LM DR		.65**	.44*	.58**	.09	.42*	−.09	.05	.10	−.22	−.17	.21
ROCF DR			.49**	.41*	.25	.35*	−.17	−.02	.27	−.16	−.24	.19
GNT				.47**	.28	.36*	.13	.28	.13	−.12	−.11	.06
MOCA					.29	.51**	.07	.23	−.00	−.08	−.20	.05
AMI Semantic						.49**	.30	.35	−.07	.25	.05	−.09
AMI Episodic							.04	.23	−.05	−.01	−.03	.04
PWB Scale								.72**	−.82**	.75**	.66**	−.74**
PANAS positive									−.66**	.60**	.56**	−.69**
PANAS negative										−.66**	−.61**	.71**
SWLS											.76**	−.80**
LOT-R												−.76**

Note. EMQ = Everyday Memory Questionnaire; LM DR = Logical Memory Test Delayed Recall; ROCF DR = Rey-Osterrieth Complex Figure Delayed Recall; GNT = Graded Naming Test; MOCA = Montreal Cognitive Assessment; AMI = Autobiographical Memory Interview (Semantic and Episodic refer to the total scores across all lifetime periods within each category).
* $p < .05$, two-tailed.
** $p < .01$, two-tailed.

memory were correlated with any of the measures of well-being, suggesting that (at least within this non-clinical group) there was no relationship between memory performance and well-being.

4. Discussion

The findings of this study suggest that well-being is more closely linked to how positively people view themselves at a semantic level, rather than at an event-specific level – an effect that was particularly pronounced in older adults.

The first aim of this study was to examine how the emotional valence of semantic self-images and associated episodic memories might differ between younger and older adults. There were few differences between age groups on the measures of episodic memory, and no differences between age groups in semantic self-image or well-being scores. As predicted, older adults rated their episodic autobiographical memories more positively than younger adults. In contrast, counter to predictions, semantic self-images were rated equally positively by adults in both age groups. This suggests that the positivity effect in ageing established for episodic autobiographical memories (e.g. Kennedy et al., 2004) may not extend to semantic self-images, replicating recent work by Chessell, Rathbone, Souchay, Charlesworth, and Moulin (2014).

The second aim was to examine the correlations between well-being and the emotional valence of both semantic self-images and episodic autobiographical memories. As predicted, the emotional valence of semantic self-images was significantly related to participants' well-being. This effect was shown in both younger and older adults, but was particularly pronounced in the older adult group, for whom semantic self-image valence correlated with all six measures of well-being. In contrast, the emotional valence ratings for episodic autobiographical memories were not correlated with any measures of well-being in older adults, and were only correlated with one measure of well-being in the younger adult group. When correlations between well-being and episodic autobiographical memory valence were compared to those between well-being and semantic self-image valence, we found – counter to our predictions – pronounced aging effects. In younger adults, there was no difference between the correlations for well-being and episodic autobiographical memory valence compared to well-being and semantic self-image valence. However, in older adults, well-being was significantly more related to semantic self-image valence than episodic autobiographical memory valence in five of the six measures of well-being. This may reflect enhanced emotional-regulation processes associated with aging (Carstensen, 2006) – a point we discuss later in this section. This key finding suggests that, in older adults, well-being is more closely linked to the emotional valence of semantic self-images, rather than episodic autobiographical memory.

The final aim was to examine the relationship between well-being and memory performance in older adults. In line with predictions, objective memory performance across a range of standardised tasks bore little relation to measures of well-being. In contrast, self-reported memory problems showed multiple correlations with well-being. These results suggest that poor memory performance per se does not necessarily equate with diminished well-being.

The current findings add to a growing body of research highlighting the important role of semantic autobiographical memory (e.g., Bohn & Berntsen, 2011; Klein & Lax, 2010; Prebble et al., 2013; Thomsen, 2009). Previous theorists have emphasised the role that this form of autobiographical memory might play in structuring retrieval of past and construction of future events (Bohn & Berntsen, 2011; Irish et al., 2012; Prebble et al., 2013), structuring a life story (Thomsen, 2009) and maintaining identity in the face of episodic deficits (Klein & Lax, 2010; Rathbone et al., 2009). Here we suggest that this factual knowledge about the self might play an additional role, through its close relationship to our judgements of well-being. Further experimental research is needed to unpick the causal mechanisms between semantic self-image valence and well-being. However, the results of this study suggest that there are very close ties between perceptions of well-being and the semantic facts that comprise self-knowledge. This finding relates to current theories on the central role that imagery plays in emotion (e.g., Holmes & Mathews, 2010). Indeed, recent studies suggest that positive imagery acts to scaffold positive affect (Blackwell et al., 2013; Torkan et al., 2014).

Within the autobiographical memory literature, imagery is more typically a hallmark of episodic, rather than semantic, autobiographical memory (e.g., Tulving, 1983, 2002). However, there is a wide literature on the clinical relevance of many different forms of imagery (Holmes & Mathews, 2010), including the construction of negative semantic images of the self (e.g. Conway, Meares, & Standart, 2004; Hirsch, Clark, Mathews, & Williams, 2003; Ng & Abbott, 2014). More research is needed to understand the nature of mental imagery associated with semantic self-images. Semantic self-images, by definition, reflect a particularly self-relevant form of imagery. Although they represent an amalgam of semantic information (e.g. being confident, sociable, keen on attending football matches), rather than discrete episodic events, the emotional valence of these semantic self-images appears to be closely linked to well-being. Future work based on cognitive bias modification paradigms may shed more light on the potential therapeutic benefits of modifying semantic self-images, in light of the success of using this approach with mental images that are episodic in nature (e.g., Torkan et al., 2014).

The present findings support the results of previous research. Firstly, across both age groups, participants' emotional ratings for both episodic autobiographical memories and semantic self-images were predominantly positive, replicating previous work (e.g., Chessell et al., 2014; Thomsen, 2009) and supporting the theory that most people tend to view themselves and their memories in a positive light (Walker, Skowronski, & Thompson, 2003). Socioemotional selectivity theory (SST; Carstensen, 2006) may explain why, for older adults in particular, more positive views of the self were associated with increased well-being. According to SST, the age-related decrease in subjective sense of future time (e.g. how much time one has left to live) leads to increased emotional regulation. Furthermore, the fact that well-being showed strong associations with the emotional

valence of semantic self-images is of particular relevance to older adults, as well as various clinical groups who demonstrate episodic deficits (e.g., Dalgleish et al., 2007; Klein & Lax, 2010; Martinelli et al., 2013). The older adults in this sample represented a healthy community-based sample, none of whom demonstrated severe memory deficits. It is thus possible that more advanced memory loss would have a greater impact on well-being (e.g., Llewellyn et al., 2008; Wilson et al., 2013). The question of how memory, well-being, and identity are inter-related in dementia is complex, and recent papers on the topic have highlighted the importance of studying identity using a range of approaches (e.g., Caddell & Clare, 2013).

The results of the present study also extend previous findings. Although we found few relationships between ratings of episodic autobiographical memories and well-being, other researchers describe significant relationships between well-being and episodic memory. For example, Philippe et al. (2012) found that young adults who retrieved memories that were rated more highly for need satisfaction tended to demonstrate increased levels of well-being. However, Philippe et al. analysed a specific component of episodic memory, related to achieving growth-related goals, whereas in the current study (in order to allow comparison of self-images and episodic memories) we used an emotional valence scale to analyse the relationship between memory and well-being. It is thus possible that other measures of the content and affective properties of episodic memories, such as redemption and contamination themes (McAdams, Reynolds, Lewis, Patten, & Bowman, 2001) or intrinsic versus integrated themes (Bauer et al., 2005), would yield significant relationships with well-being.

Crucially, few studies that measure the relationship between episodic memory and mood or well-being (e.g., Gillihan, Kessler, & Farah, 2007; Philippe et al., 2012) also include measures of semantic autobiographical memory, such as self-images. Thus it is possible that when memories have been shown to have an impact on well-being, they may have done so via their relationship with semantic facts about the self. This mediating role of semantic autobiographical memory has been proposed in models of memory and identity (e.g., Haslam et al., 2011). It is possible, therefore, that semantic self-images play a similar mediating role in promoting well-being, and this again would be an interesting avenue for future research.

The present research was subject to several limitations and suggests multiple avenues for future work. First, the study employed a correlational design and as such it cannot speak to the causal direction between the constructs of semantic self-image valence and well-being. Whilst it is possible that viewing the self in a positive light promotes well-being, it is equally possible that higher levels of well-being lead people to take a more positive view of themselves. Future studies employing experimental designs will be needed to unpick the direction of effects, however it seems likely that a bi-directional relationship exists between semantic self-image and well-being (as would be predicted by models such as the self-memory system; Conway, 2005). Indeed, the self-system is widely regarded to be dynamic and likely to change depending on mood and context (e.g., Markus & Kunda, 1986; Showers, Abramson, & Hogan, 1998). What the present research clearly indicates is that the emotional appraisal of semantic self-images is closely related to a range of well-being measures. Regardless of bi-directional effects, if focusing on positive self-images could be shown to raise levels of well-being this would have important therapeutic implications. A second point relates the lack of counter-balancing between the set of well-being measures and the memory tasks. To avoid priming particular aspects of identity, the semantic self-image generation task was completed first. Thus, future studies will be required to rule out potential order effects.

4.1. Conclusions

In their recent review, Prebble et al. (2013) suggested that research needs to explore the semanticised summaries of life narratives, as well as specific event memories, in order to develop a more complete picture of the roles of episodic and semantic autobiographical memory. The present paper addressed this aim and found that the valence of semantic self-images may be more fundamental to conceptions of well-being than that of episodic autobiographical memories. In essence, we found clear relationships between how positively people perceive themselves and their overall well-being. This relationship was particularly pronounced in older adults, for whom a wide range of well-being measures correlated with ratings of semantic self-image valence. In addition, older adults' performance on standardised measures of cognition and memory bore no relation to ratings of well-being. These findings have implications for promoting well-being in aging. It seems that well-being does not depend on what you remember, or even how good your memory is – what is key is how you conceptualise your sense of self in the present moment.

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